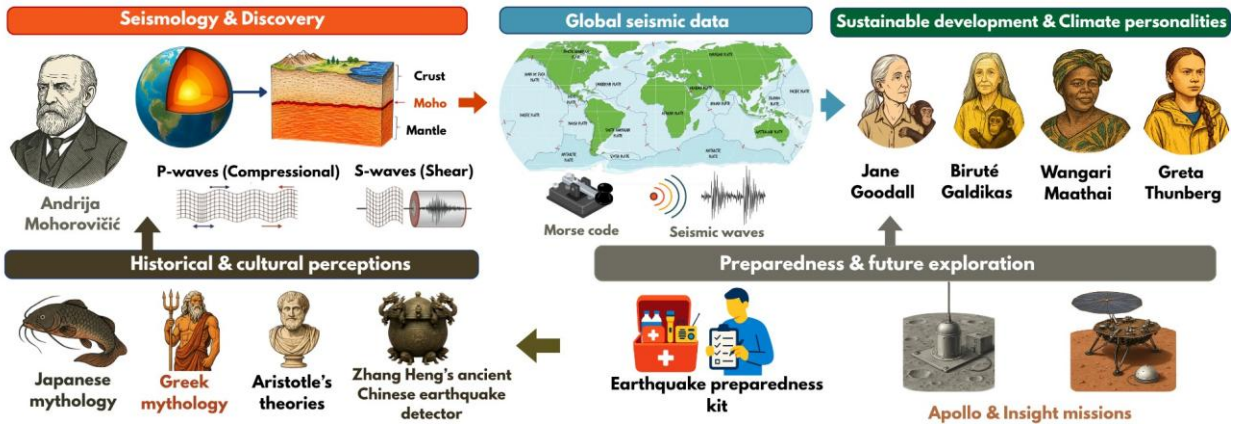
Natural Built Social Environment Health

ISSN 3085-461X

www.nbseh.org

BOOK REVIEW

When Worlds Quake: The Quest to Understand the Interior of Earth and Beyond, by Hrvoje Tkalčić. Princeton: Princeton University Press, 2026, 312 pp., $29.95/£25.00 (hardcover), ISBN: 9780691271477.



Every exceptional person often carries within his or her heart a secret source of inspiration that nourishes the creativity and shapes the originality of the works. For a painter, this may be an imaginary landscape glimpsed somewhere between "perception and memory, something like Monet's *Impression Sunrise* [1]. For a poet or a romantic singer, this may be a certain "Madeleine", that silent figure of Absence and Waiting, the beloved woman who never comes, sometimes more alive in the heart than in reality [2]. For an inventor, this may be a luminous idea patiently pursued throughout life, like a distant star, much like Nikola Tesla pursuing an almost utopian vision of universal energy [3]. And for Hrvoje Tkalčić, one senses in this book that he feels a particularly deep admiration for Andrija Mohorovičić (Moho), who seems silently to accompany the entire narrative (pp. 37–64).

Moho (1857–1936) was a Croatian scientist, like Tkalčić, fascinated by the vibrations of the Earth. He was behind the discovery of the discontinuity between the Earth's crust (the outer layer where we live) and the deep mantle (denser and hotter), enabling humanity better to understand how and why seismic waves suddenly changed speed at a certain depth, and this

indeed occurs during the crossing of this boundary. This layer still bears his name to this day: "the Moho" (Figure 1).

Andrija Mohorovičić represents, for the author, and for the future, the symbol of an intellectual curiosity capable of crossing the boundaries of monodisciplinarity. Hrvoje Tkalčić does not speak of Andrija Mohorovičić as a simple scientific name in this work. He speaks of him with affection, respect and intellectual admiration, and this can be felt throughout several passages. It is only natural, since Mohorovičić, using only simple means that were still poorly developed in his time, succeeded in bringing forth a theory that would profoundly transform our understanding of the Earth. The author of the book indeed resembles him greatly, and this is probably why Tkalčić allows this feeling of particular closeness towards him to emerge. And throughout the book, just like him, he constantly insists on the importance of open and interdisciplinary thinking, and of scientific imagination, in stimulating creativity.

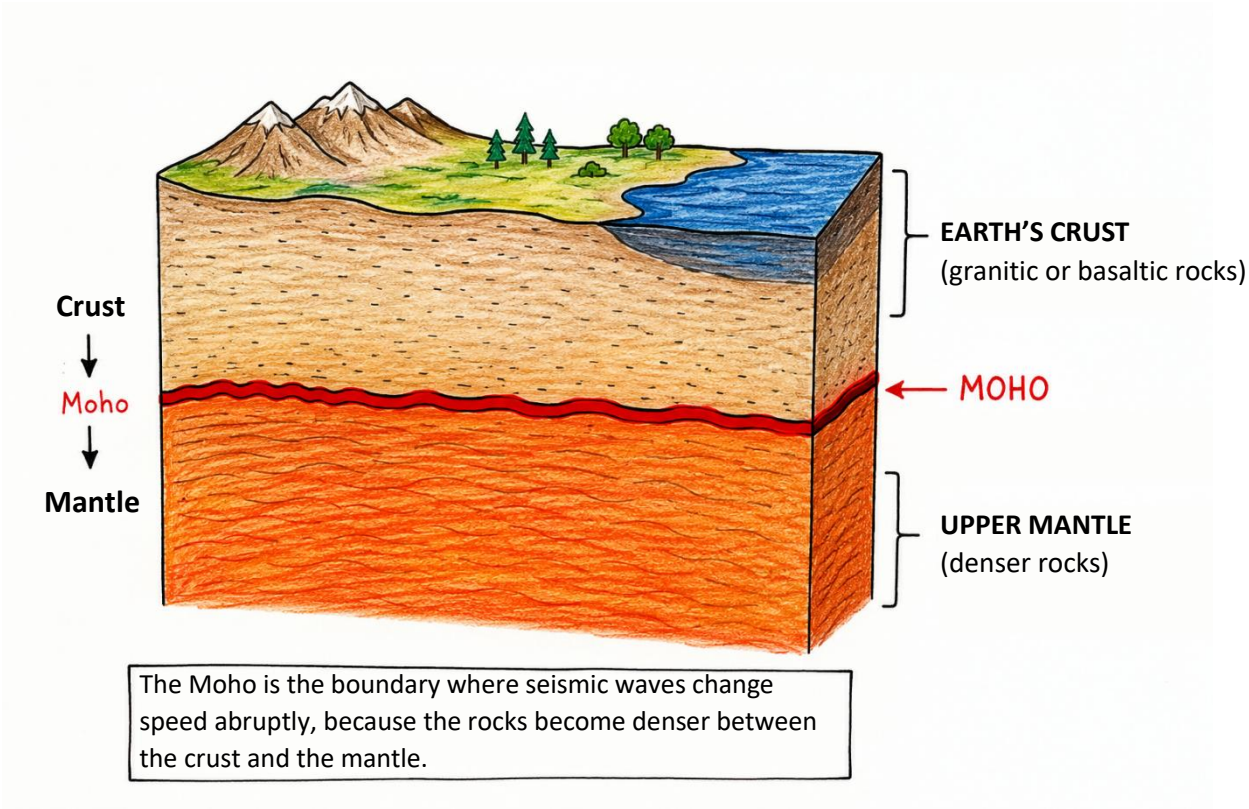

Crust
Moho
Mantle
EARTH'S CRUST
(granitic or basaltic rocks)
MOHO
UPPER MANTLE
(denser rocks)
The Moho is the boundary where seismic waves change speed abruptly, because the rocks become denser between the crust and the mantle.

Figure 1. The Mohorovičić discontinuity (Moho), marking the boundary where seismic waves abruptly change velocity owing to the increase in rock density between the Earth's crust and the mantle

This book vibrates with joy, to the rhythm of the "P" and "S" waves of an earthquake (pp. 37–64); each pulsation, each impulse seems to express itself in Morse code in order to allow the

"Sharp Look Inside" (p. 118) to discover gradually the secrets hidden beneath our feet. With each completed chapter, something changes in our perception: the ground beneath our feet appears to be moving… The mountains seem slowly to breathe… The oceans become witnesses to a very ancient past… And the stars remind us that the Earth began long before us, somewhere within the luminous dust of the universe (pp. 12–22), reminding us… reminding us… of all the other silent stories.

In order to manage pain or fear, one must mentally enter into the very mechanism that causes them: imagine the movement, the sound, the gesture, and almost physically understand the action taking place. This is how I manage, for example, to tolerate an injection, or even stage fright during a plenary address; instead of fleeing from the sensation, I enter into it with the mind, and the pain then becomes far more bearable.

Tkalčić never seeks to frighten when he evokes or predicts terrible earthquakes that caused major damage in the past, such as the 1906 San Francisco earthquake (pp. 23–36), sometimes accompanied by tsunamis (pp. 158–178). On the contrary, Tkalčić chooses very quickly to reveal the associated mechanism, as if to help master emotions before progressively enlightening us. He writes, for example, that "earthquakes simply come from blocked energy". Or again, that natural disasters have not only destroyed the Earth; they have also contributed to the gradual construction of a habitable planet and still continue today to maintain its balance.

The book also explains triangulation in a very elegant manner, showing how, with a little time and mathematics, it becomes possible to predict and locate an earthquake (pp. 158–178).

The book is entirely enjoyable when it interrupts, from time to time, the scientific discourse with a small pause, by telling a story, a "once upon a time", such as that ancient legend told long ago in Japan to explain why the Earth trembled: a gigantic catfish named Namazu lived beneath the Earth, and whenever he shook his tail, the whole world began to tremble (pp. 12–22). In other parts of the book, one also encounters the story of Poseidon, the Greek god of earthquakes, followed by that of Aristotle (pp. 87–117), who believed that earthquakes came from winds trapped beneath the Earth. The book also recounts the story of Zhang Heng (pp. 136–157), an ancient Chinese scholar who designed the first earthquake detector. He created a large vessel surrounded by dragons holding balls in their mouths; when an earthquake occurred, a ball would fall in the direction of the earthquake (pp. 136–157). The book also refers to the

Apollo program missions, which made it possible to install seismographs on the Moon, as well as the InSight seismograph sent to Mars in an attempt to uncover the mysteries of that planet (pp. 224–254). Magnificent stories which show how human beings have always sought to explain or to listen to the invisible.

One also becomes immersed in the accounts and real testimonies reported by people who experienced earthquakes: some compare the sensation to being aboard a boat, others describe the movement as a dance, a rolling of the ground or of the walls. And all this is important, because these perceptions also contribute to understanding the impact and influence of earthquakes, in order to construct a more complete image of the phenomenon (pp. 87–116). Personally, I experienced earthquakes twice in my life, fortunately without damage in my city: the first time in Casablanca, I believe about 2011 or a little later, then another time in Mohammedia during the 2023 Marrakesh–Safi earthquake in 2023, whose epicentre was located near Ighil, in the High Atlas. Even from a distance, the tremors were sufficiently striking to remind us how profoundly the deep movements of the Earth can be silently felt far beyond their point of origin [4].

The book becomes even more appealing when Tkalčić occasionally intersperses the scientific discourse with short explorations of exceptional places, of his exploratory adventures and his scientific journeys, in order to provide a vision of the real life of a geophysicist seismologist (pp. 158–223). He speaks extensively about California and the famous San Andreas Fault, which gave rise to the 1906 San Francisco earthquake. He also devotes a major chapter to the red Australian Outback (pp. 158–186), which he describes as an almost extraordinary world, an ideal natural laboratory for studies in geophysics, situated near the boundaries of tectonic plates where the plates collide intensely. In this universe, every mountain, every rock tells the ancient story of the Earth and of past events, such as Uluru (pp. 158–186).

Scientists install seismometers everywhere in order to listen to the interior of the Earth, and often, even at the bottom of the oceans (pp. 188–222); every place matters and contributes to constructing a more complete vision of the underground world.

The book closes while preserving the spirit of the “Moho”, that invisible boundary which also reminds us of the limits of science itself. Despite all scientific advances, certain regions close to the Earth’s core still remain profoundly mysterious and constitute, according to the author,

the deepest archives of Earth's history. And beyond models, calculations and technologies, the author reminds us with simplicity that the best protection against earthquakes remains, above all, preparedness.

Through the figure of Andrija Mohorovičić, Hrvoje Tkalčić seems to extend this intellectual heritage with the same sensitivity towards the Earth and natural mysteries. Such figures succeed in helping us better to understand our own place in this fragile world, the risks surrounding us, the invisible balances upon which our existence silently depends, and the limits necessary to restrain the excesses and abuses of human beings towards nature. The world today perhaps needs more than ever these rare personalities, such as Birutė Galdikas, Jane Goodall or Wangari Maathai, whose work extends far beyond their scientific speciality in order to become a presence capable of acting in favour of humanity and the entire world.

References

[1] Impression, Sunrise (1872). Oil on canvas, 48 × 63 cm (18.9 × 24.8 in). Musée Marmottan Monet, Paris.

[2] Yaeger, L., 1985, *Le Hermos Brelien Et Les Grands Thèmes De Jacques Brel* (Doctoral dissertation). Carroll College, Helena, Montana. https://scholars.carroll.edu/bitstreams/60e6e583-e1b7-46a7-babc-11384a6395a7/download

[3] Marincic, A. S., 1982, Nikola Tesla and the wireless transmission of energy. *IEEE Transactions on Power Apparatus and Systems* **10**, 4064-4068. https://doi.org/10.1109/TPAS.1982.317084

[4] van Der Woerd, J., 2023, *Séisme au Maroc.* Encyclopedia Universalis (September). https://cnrs.hal.science/hal-04727397

© 2026 Nadia Boutaleb

nadia.boutaleb@fstm.ac.ma

How to cite this article

Boutaleb, N., 2026, Book Review - **When Worlds Quake: The Quest to Understand the Interior of Earth and Beyond,** by Hrvoje Tkalčić. Princeton: Princeton University Press, 2026, 312 pp., $29.95/£25.00 (hardcover), ISBN: 9780691271477. *Natural Built Social Environment Health* **2**(3), 190-194. http://www.doi.org/10.63095/NBSEH.26.432468